Neurology embryology

Week 3 and week 4

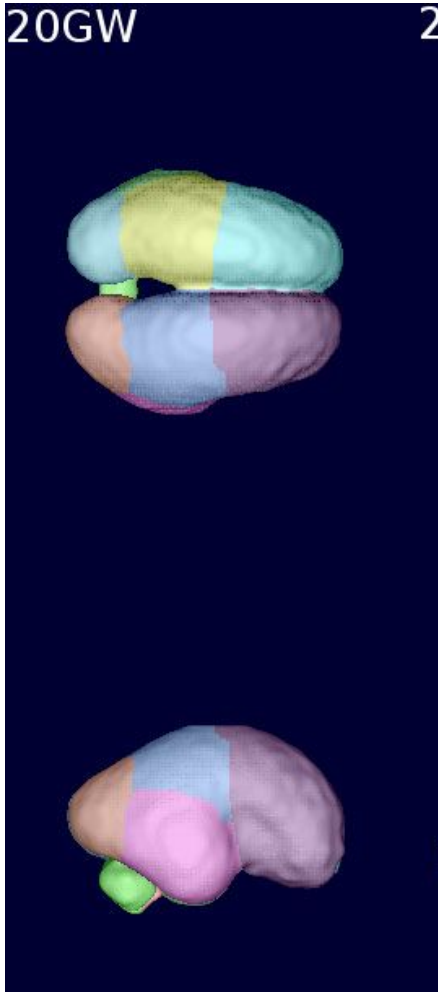
In week 3 the nervous system starts as as thickening from the ectoderm to make the neural plate.

It then invaginates into the neural groove which folds into the neural tube by the start of week 4.

Neural crest cells bud off the tube to become the SNS, ganglia neurons, schwann cells and meninges

The rostral and caudal neuropores close on day 24.

The rostral side becomes the brain and makes flexures.



Parts of the neural tube

Three are 3 layers:

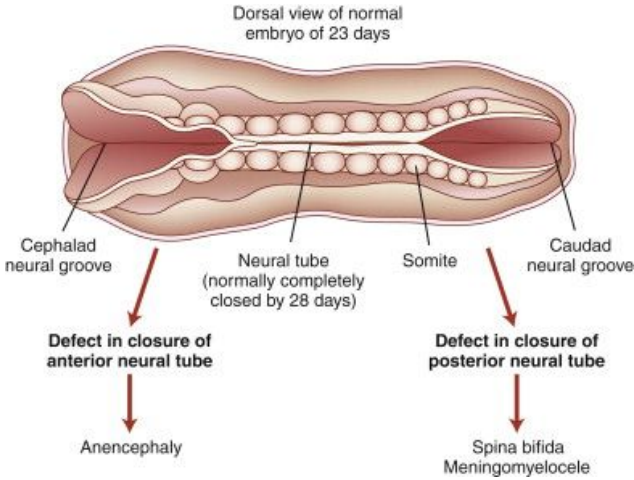
The outer marginal layer becomes the white matter of the NS

The middle mantle layer become the grey matter of the NS

It splits into 2 layers - it is split by the sulcus limitans

- Alar plate is dorsal and sensory afferent neurons
- Basal plate is ventral and motor efferent neurons

Inner ependymal layer becomes the lining of the central canal of the spinal cord and brain vesicles



Primary brain vesicles

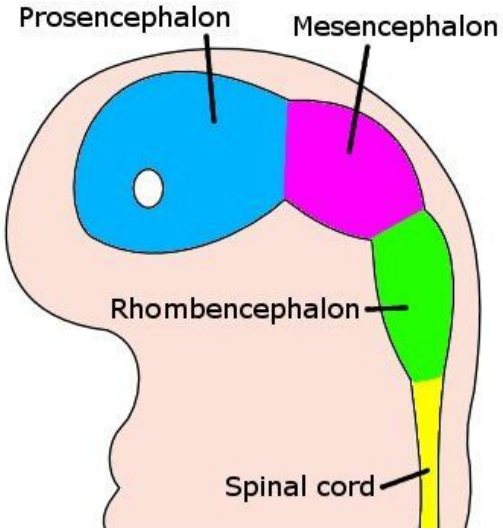
At the rostral end of the neural tube will 3 bulges form.

This occurs in week 4.

Prosencephalon - forebrain

Mesencephalon - midbrain

Rhombencephalon - hindbrain



Secondary brain vesicles

The primary vessels will split into secondary brain vessels

This occurs in week 5.

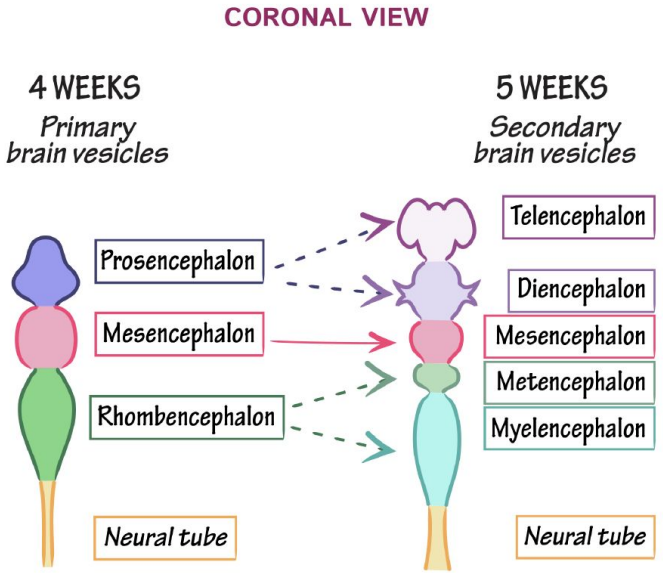
Prosencephalon becomes:

- Telencephalon
- Diencephalon

Mesencephalon remains as it is

Rhombencephalon becomes:

- Metencephalon
- Myelencephalon



Adult brain structures

Telencephalon becomes:

- Cerebrum
  - Cortex
  - Basal nuclei

Diencephalon becomes:

- Diencephalon
  - Thalamus
  - Hypothalamus
  - Epithalamus

Mesencephalon becomes:

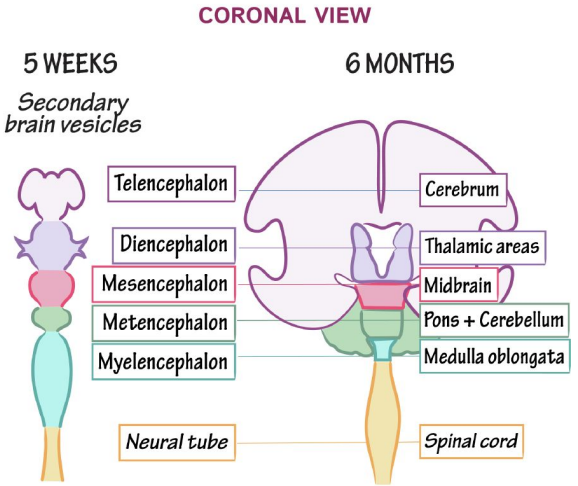
- Midbrain
- Cerebrum

Metencephalon becomes:

- Pons
- Cerebellum

Myelencephalon

- Medulla



Adult neural tube structures

Telencephalon becomes:

- Lateral ventricles

Diencephalon becomes:

- 3rd ventricle

Mesencephalon becomes:

- Cerebral aqueduct

Metencephalon becomes:

- 4th ventricle

Myelencephalon

- Central canal

The spinal cord ends at L1 in adults, ending at the cauda equina because the neural tube is outgrown by the skeleton

The neural tube is most preserved at the central grey of the cord and periaqueductal grey of the midbrain and is most elaborated in the cerebral and cerebellar hemisphere/

Induction

Chordin and noggin - Affects overlying ectoderm to stop epidermis formation into neural precursor cells

Bone morphogenetic protein 4 (BMP4) - Stimulates epidermis formation

Sonic Hedgehog - Induces the ventral/basal part to develop motor neuron characteristics

Retinoic acid and homeobox genes - causes rostral - caudal patterning

Nerve growth factor - Prunes off certain nerve connections

to go through apoptosis

Question 1

Which one of these is not a secondary brain vesicle?

1. Telencephalon
2. Metencephalon
3. Diencephalon
4. Prosencephalon
5. Mesencephalon

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Question 2

What buds off to make the sympathetic NS?

1. Neural groove
2. Neural crest cells
3. Neural tube
4. Primitive nerve cells
5. Notochord

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Question 3

Where is the neural tube most preserved?

1. Periaqueductal grey of the midbrain
2. Cerebral and medullary hemisphere
3. Brainstem
4. Periaqueductal grey of the medulla
5. Peripheral grey of the cord

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